



# Public Health Goal for Perchlorate

A fact sheet by Cal/EPA's  
Office of Environmental Health Hazard Assessment  
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The Office of Environmental Health Hazard Assessment (OEHHHA) has prepared this fact sheet to provide general information about its Public Health Goal (PHG) of 6 parts per billion (ppb) for perchlorate, a drinking water contaminant. OEHHHA has determined, based on currently available data, that this level of the contaminant in drinking water does not pose a significant risk to health.

**What Is Perchlorate?** Perchlorate is a chemical used to facilitate combustion of rocket and missile fuel, explosives, fireworks, and road flares. It may also be used in air-bag inflation systems, lubricating oils, and the manufacture of paints and many industrial goods. In the past, physicians used perchlorate to treat Graves' Disease, a disorder that causes an overproduction of thyroid hormones.

**Perchlorate in Ground and Drinking Water.** Outdated disposal practices in the decades prior to modern environmental laws allowed perchlorate to contaminate groundwater, particularly near weapons and rocket fuel manufacturing facilities and disposal sites, research facilities, and military bases.

The Department of Health Services (DHS) in February 2004 reported detections (down to the lowest measurable level of 4 ppb) of perchlorate in 348 drinking water sources in 88 systems in Los Angeles, San Bernardino, Riverside, Orange, Sacramento, Santa Clara, Tulare, Ventura, San Diego and Sonoma counties. Most of the affected sources are groundwater wells, although perchlorate has also been detected in sources containing water from the Colorado River. Of these 348 sources, a total of 24 sources contain perchlorate at levels exceeding 40 ppb. Drinking water suppliers are monitoring their water for perchlorate as required by DHS, and very few drinking water systems are providing water to their customers with perchlorate levels exceeding 4 ppb.

**Perchlorate is used in rocket fuel, air bag inflation systems, lubricating oils, and the manufacture of paints and industrial goods.**

**Health Effects of Perchlorate.** One of the more serious human health effects observed in scientific studies is perchlorate's disruption of thyroid hormone production. The thyroid produces two principal hormones, triiodothyronine (T3) and thyroxine (T4), which help to regulate the body's metabolism and physical growth. To produce these hormones, the thyroid needs iodide, which the body absorbs from iodized salt, seafood, and other foods. Perchlorate, however, blocks the transport of iodide to the thyroid gland. If the blockage persists and the thyroid's iodide reserves are significantly reduced, the thyroid may decrease its production of T3 and T4. The pituitary gland and the hypothalamus, which regulate thyroid hormones, in turn elevate their own hormone production to compensate for the lowered levels

of T3 and T4. Because T3 and T4 hormones are essential to the body's production of energy and rate of metabolism, as well as to mental performance, any notable imbalance can significantly impair all of these functions. Inhibited thyroid function can result in hypothyroidism.

Pregnant women and their developing fetuses may suffer the most serious health effects from perchlorate contamination in drinking water, particularly in the first and second trimesters of pregnancy. During this period, the fetal thyroid is not yet fully functional, so the mother's thyroid must be able to produce enough extra T4 hormone to enable her baby's brain to develop properly.

Because pregnancy already places a strain on the maternal endocrine system, pregnant women and their fetuses are particularly susceptible to perchlorate's inhibition of iodide intake. The developing fetuses of women with critically low levels of iodide can suffer congenital hypothyroidism, which may stunt the fetus's physical growth and impede proper development of its central nervous system. Even moderate to mild iodide deficiency during pregnancy has been linked to impaired brain development and lower IQs for children born under these conditions. Perchlorate does not directly cause these effects by itself, but it can cause iodide deficiencies that, in turn, can impair the development of the brain and central nervous system.

Infants exposed to perchlorate could be similarly affected. Perchlorate may also affect the beneficial uptake of iodide into breast milk.

**Perchlorate Evaluations.** Efforts to evaluate perchlorate's health effects for purposes of establishing goals and regulatory standards extend back more than a decade. In 1992, the U.S. Environmental Protection Agency (U.S. EPA) published a provisional "reference dose" for perchlorate exposure that would not be expected to pose a health threat. The reference dose was equivalent to a drinking water concentration of 4 to 18 ppb. In 1997, DHS set a state "action level" (an advisory level for contaminants for which there is no regulatory standard) of 18 ppb for perchlorate. In 1998, Governor Pete Wilson directed OEHHA to begin development of a PHG for perchlorate. In 2002, U.S. EPA released a revised draft perchlorate reference dose (currently under review by the National Academy of Sciences) that corresponds to a drinking water concentration of 1 ppb. Also in 2002, DHS revised the state action level to 4 ppb, and OEHHA released a draft document proposing the PHG be within the range of 2 to 6 ppb. The California Legislature in 2002 passed a bill that formally requires OEHHA to establish a PHG and DHS to establish a regulatory drinking water standard for perchlorate. DHS now intends to revise the state action level to 6 ppb to be consistent with the PHG.

**OEHHA published a PHG of 6 ppb to protect the health of pregnant woman and their developing fetuses, the groups with the greatest sensitivity to perchlorate.**

**Establishing the PHG for Perchlorate.** State law requires OEHHA to develop PHGs for chemical contaminants in California's publicly supplied drinking water. A PHG is the level of a chemical contaminant in drinking water that, based upon currently available data, does not pose a significant risk to health. It represents a health-protective level that the state's drinking water providers should strive to achieve if it is possible to do so. State law requires DHS to set regulatory drinking water standards as close to the corresponding PHGs as is economically and technically feasible, placing primary emphasis on the protection of public health.

In developing the PHG for perchlorate, OEHHA conducted a thorough analysis of all available scientific studies on perchlorate's health effects. OEHHA published a PHG of 6 ppb because it determined that this level of perchlorate in drinking water would not pose a hazard to pregnant women and their developing fetuses, the groups with the greatest sensitivity to perchlorate.

Prior to its publication, the PHG for perchlorate underwent a rigorous review process that included two separate rounds of external scientific peer review by the University of California, two public comment periods and a public workshop, as well as a peer review by the U.S. Environmental Protection Agency.

**Regulatory Steps.** The PHG is a goal, not a regulatory requirement. DHS will use the PHG as the health basis for a regulatory drinking water standard, officially known as a Maximum Contaminant Level (MCL). Publicly supplied drinking water in California will not be allowed to contain perchlorate at levels exceeding the MCL. In establishing the MCL, DHS may consider economic factors such as water-treatment costs and available treatment technologies. OEHHA is prohibited by law from considering any economic or technological factors in establishing a PHG.

There currently is no federal drinking water goal or standard for perchlorate. The federal government has not yet decided whether to develop a national regulatory standard for perchlorate.

**For More Information.** The PHG document, including OEHHA's responses to comments received during the peer reviews and public comment periods, is available for downloading from OEHHA's Web site at <http://www.oehha.ca.gov>. The Web site also has a general fact sheet on PHGs and a supplemental fact sheet addressing frequently asked questions about the PHG for perchlorate. Further information on PHGs can be obtained by contacting OEHHA at (916) 324-7572, or by mail at P.O. Box 4010, Sacramento, CA, 95812-4010.